

### Physics Goals

- Measure Solar Neutrinos with CC, NC and ES reactions/interactions
- Resolve Solar Neutrino Problem
- Provide the first direct evidence for Solar Neutrino Oscillations through the comparison of NC/CC flux determinations, Day/Night solar neutrino spectra, Seasonal Measurements of Neutrinos,
- Provide evidence for, or increased limits on, proton decay, cosmic ray muons fluxes,  $n$ - $\bar{n}$  oscillations, supernovae detection, and associated subjects.

### Features

- 1000T D<sub>2</sub>O water Cerenkov Detector
- Situated in the world's deepest experimental site with >6000 mwe shielding
- Ultralow background materials and site

### Technological Challenges

- Ultra clean environment, submerged detector systems, underground working nickel mine, maintenance-free design, low background materials Ultrapure water environment
- High PMT coverage and packing fraction, low-mass design, ~ water tight geodesic design
- Large data volumes, essentially a rare process analysis,
- International collaboration

### LBNL Contributions NSD + Engineering + NERSC + Contractors

- PMT Support structure (\$5.5M), calibration devices (16N chamber  $p,T$  source, BUTTS, LEDs, NaI, AmBe sources), low background counting, material selection and QC, component cleaning and cleanliness monitoring techniques, participants in NCD project
- Initially 2 physicists + 5 engineers, ultimately 7 - 8 physicists
- NERSC data processing with PDSF cluster + HPSS data storage

### LBNL Involvement and Role

- Major detector systems (PMT array): lead
- Calibration devices (16, NaI, AmBe,  $p,T$ ): lead
- Data analysis: lead and significant participants
- Experimental Management and Analysis working groups: Lead and significant participants
- Low Background Counting: lead
- NCDs: participant
- Cleanliness and contamination control: participant

**Status** Taking data, ~ half-way through experimental program

**Timeline** Initial proposal '87, '89 "Temple" review, Funded '90, Construction '90 – '98, Physics '98 - 06

**Collaboration** ~100 to 125 Nuclear and Particle Physicists, Canada (40%), US (50%), UK (10%)

**Location** Sudbury, Ontario Canada  
**Funding Sources** USDOE, NSERC, PPARC  
**Resources, Links, and Refer** SNOHP2.LBL.GOV

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